(No Model.) 3 Sheets—Sheet 1.

E. W. LUCE.

AUTOMATIC CAR BRAKE.

No. 493,100. Patented Mar. 7, 1893.

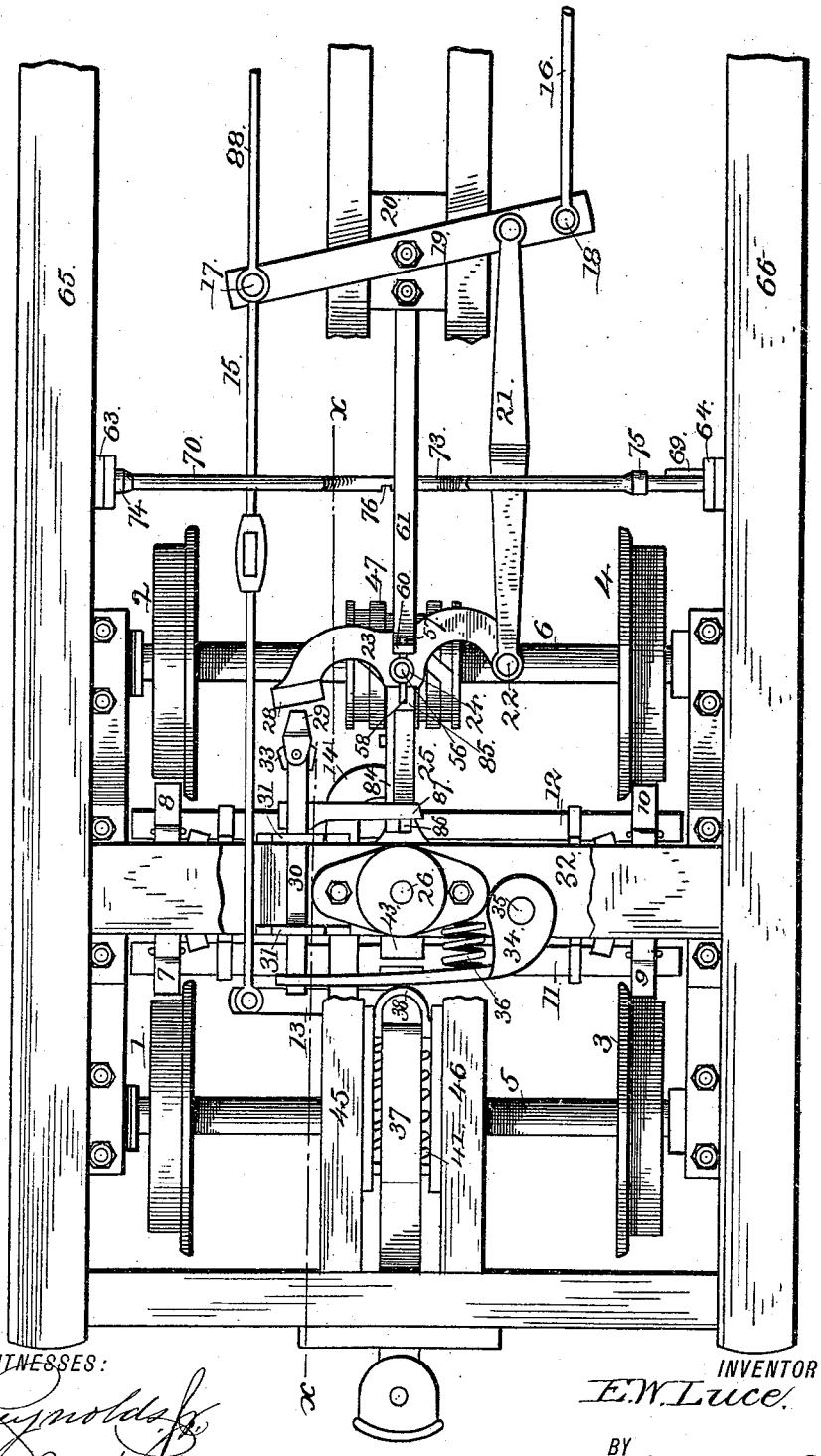

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

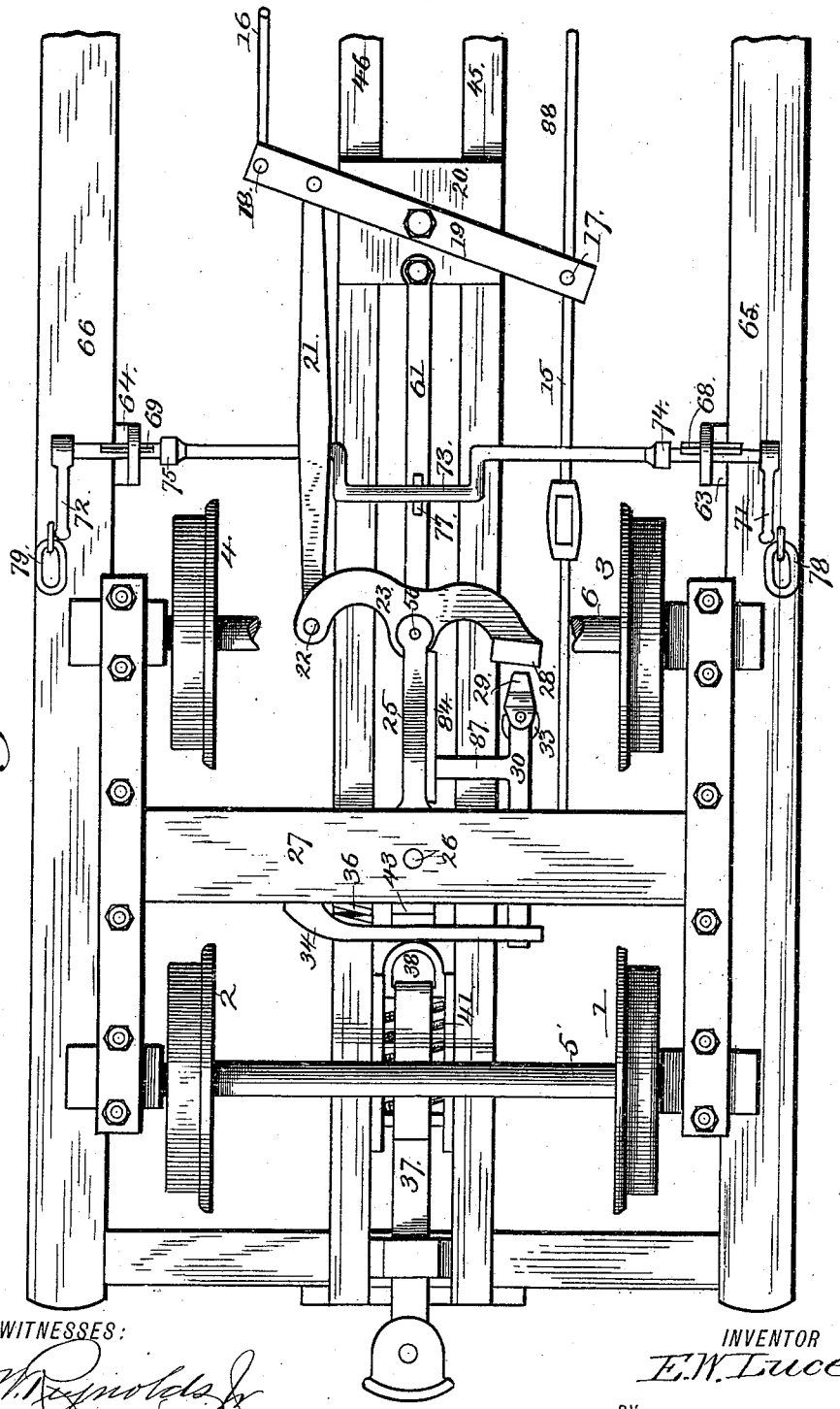

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Fig. 3.

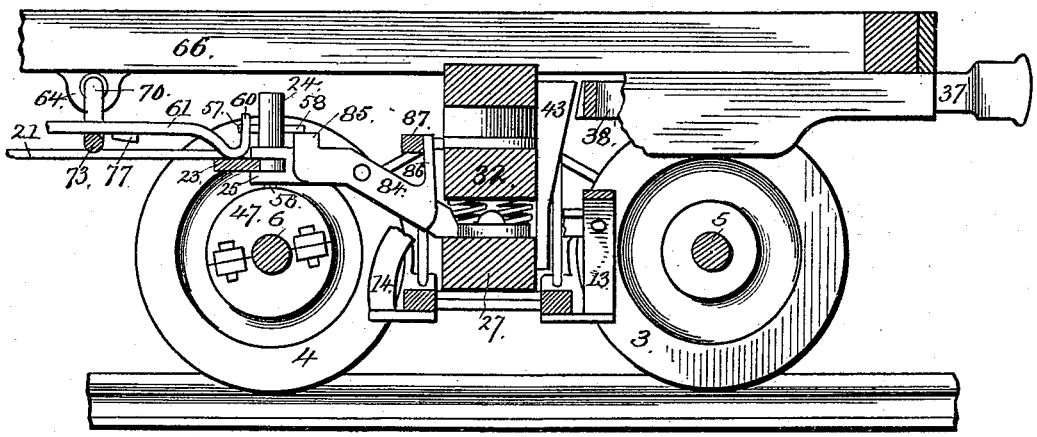


Fig. 4.

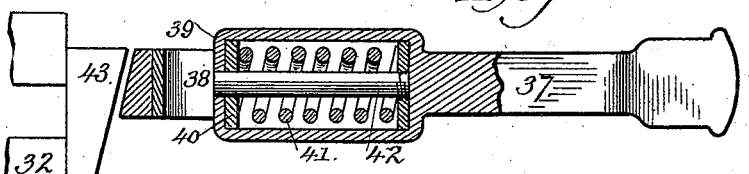


Fig. 5.

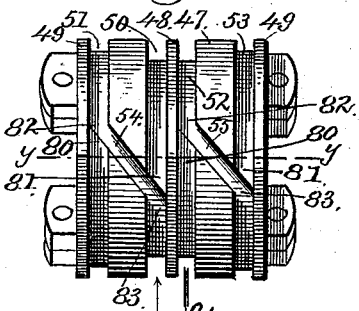


Fig. 6.

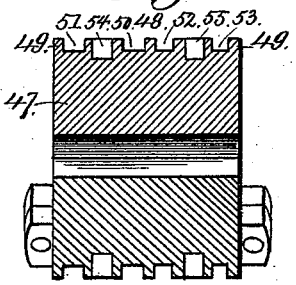


Fig. 7.

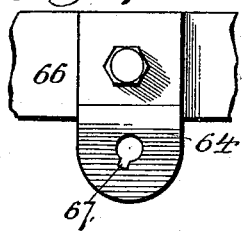
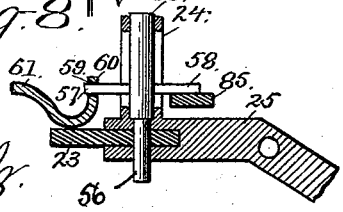


Fig. 8.



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AUTOMATIC CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 493,100, dated March 7, 1893.

Application filed November 11, 1891. Serial No. 411,587. (No model.)

To all whom it may concern:

Be it known that I, EDWIN W. LUCE, a citizen of the United States, residing at Meadville, in the county of Crawford and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Car-Brakes; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to automatic car brakes and has for its object to simplify and cheapen their construction and to generally improve them and increase their efficiency.

With this object in view my invention consists in the improved construction, arrangement and combination of parts hereinafter fully described and afterward specifically pointed out in the claims.

In the accompanying drawings:—Figure 1 is a top plan view of so much of a car as is necessary to illustrate my invention, the longitudinal and cross beams of the floor frame being partially broken away the more clearly to show the operative mechanisms. Fig. 2 is a bottom plan view of the same portion of the car as is shown in top plan view in Fig. 1, some of the ordinary brake mechanism being removed to more clearly show the mechanisms involved in this invention. Fig. 3 is a longitudinal sectional view on the line *x—x* of Fig. 1 extending from the bumper or drawhead to include the shifting bar, parts being broken away for purposes of illustration. Fig. 4 is a central longitudinal section through the draw head extending to and taking in part of the cross beams of the frame. Fig. 5 is a view (in elevation or plan—both being the same) of the cam groove or switching cylinder of the shifting mechanism. Fig. 6 is a longitudinal section through the same on the line *y—y* of Fig. 5. Fig. 7 is a detail view, being a side elevation of one of the brackets in which the shifting bar is mounted. Fig. 8 is a detail view, being a longitudinal section through parts immediately connected with the switch pin.

Like numerals of reference mark the same parts wherever they occur in the various figures of the drawings.

Referring to the drawings by numerals, 1, 2, 3 and 4 are the wheels, 5, 6, the axles, 7, 8, 9, 10, the rubbers or shoes of the brakes, 11, 12, the brake beams, 13, 14, the brake levers and 15, 16 the brake rods. All these parts are of any well known or approved construction whereby power applied to one of the rods is transmitted to the brakes. As is usual these rods 15 and 16 are connected to the opposite ends 17, 18, of a lever 19, pivoted to a plate 20 attached to the longitudinal beams of the floor frame near the mid length of the car. The power is applied to this lever through a bar 21, which in ordinary brakes, is connected by a chain to the mechanism, such as the usual brake wheel and shaft around which such chains are wound. At this point however the mechanism of my invention begins. This rod 21 instead of being connected to a chain, &c., as in ordinary brakes, is connected at its other end to one end 22 of a lever 23 pivoted at its center 24 to one end of a carriage 25 which is itself pivoted at its opposite end to the bolt 26 at the center of the truck, said carriage resting upon the lower cross beam 27 of the truck whereby it always maintains the same level, being unaffected by the up and down movement of the body of the car.

At the opposite end of the lever 23 is formed a head or face 28 and when it is desired to put down the brakes through the train of mechanism before described, a bumper head 29 is forced against this head 28 causing the lever 23 to move on its pivot 24 and by actuating the rod 21, actuate all the rods, levers, and beams to the brake shoes. This bumper head 29 is pivotally attached to the end of a bar 30 which is mounted to slide in brackets 31 secured to the upper cross beam 32 of the truck of the car body, the pivotal attachment of the head being for the purpose of allowing it to turn aside if moved sidewise while in contact with the face 28 (by accident or mistake) and thus prevent injury to the parts. It is returned to its central position when released by a follower 33 actuated and normally held in contact with the head by a spring (not shown).

The bar 30 at its opposite end is connected

in any suitable way (in this instance by being passed into a switch) to the free end of a lever 34 pivoted at its opposite end at 35 to the upper cross beam 32 of the truck, this lever 34 extending past and slightly beyond the center of the car on each side, and being held normally in its outer position by a spring 36 placed between it and the beam 32. In this position the lever 34 is in the longitudinal path of the drawbar 37 of the car and is operated upon to force it inward, against the action of spring 36 by a yoke 38 embracing the inner end 39 of the drawbar. This yoke has its inner end 40, inside the draw bar, resting against the end of a spring 41 located inside the draw head and the spring and end 40 are both guided in action by a rod 42. Owing to this provision the pressure inward of the yoke is by means of the spring and after the correct pressure (as previously determined by the resisting power of the spring) has been exerted, any excess will be taken up by the spring and breakage prevented. The extent of the inward movement of the yoke 38 and as a consequence the pressure of the brakes, is limited by a stop 43 secured to the lower cross beam 44 of the truck.

As is well known there is a greater pressure necessary to overcome the momentum of a loaded car than that of a light car, and it is extremely desirable that this pressure be automatically regulated. This I do by making the stop 43 of wedge shape the head being upward and in the path of the yoke when the car is light. I also provide the forward end of the yoke with a wedge shaped projection so that there will be a close contact between it and the wedge stop 43.

As before stated the stop is attached to the lower cross beam of the truck, while the draw bar is attached to the longitudinal beams 45, 46, of the floor frame. These beams of course move up and down as the car is lighter or heavier, according as the supporting springs are elongated or compressed, in consequence of which when the car is light the yoke will come in contact with the head or upper thick end of the wedge. As the car is loaded the yoke is moved downward, and as the wedge stop is stationary, the point of contact between the yoke and the wedge stop moves downward on the stop, and as the thickness of the stop gradually decreases, the yoke will be permitted to travel a relatively longer distance before it comes in contact with the stop. This increase of travel of the yoke permits a greater pressure upon the brakes and accomplishes the object sought, that is to say, automatically increasing the pressure on the brake as the load increases.

I have explained how the pressure is applied to the brake by the inward motion of the drawhead. This inward motion is caused by the momentum of the car in this manner. The train being in motion and it being desired to stop it, the engineer slackens the speed of the engine, whereupon the cars run up against each other, pressing the drawheads in and causing the brakes to be set in the manner set forth. This operation will stop the cars very quickly but the brakes being set, it would be impossible to back the train without letting them up or releasing them, in the first place and providing means whereby they will be maintained in their inoperative position as long as desired. This is one of the principal purposes of my invention and the construction and operation of the mechanism for producing these effects will now be described.

On the inner axle 6 of the truck illustrated is centrally mounted a cylinder 47 which I denominate the switching cylinder. It is provided with two sets of grooves, one set being located on each side of a central land or rib 48 as shown in detail in Figs. 5 and 6. Each set consists of an annular groove of which the rib or land 48 forms the inside, an annular groove of which the rib or land 49 on the outer ends of the cylinder form the outer side and switching grooves at intervals connecting these annular grooves. The annular grooves are marked 50, 51, 52 and 53, and the switch grooves 54 and 55, and the switch grooves 54 and 55 of the two sets are inclined in the same direction. The pivot 24 of lever 23 is elongated upward and forms a sleeve in which is placed, loosely enough to move freely up and down therein, a pin 56 the lower end of which acts in the grooves of the cylinder as will be hereinafter described. Through slots in the sleeve a cross pin is set in the switch pin 56 having an end 57 projecting toward the center of the car and an end 58 projecting toward the end of the car. The inner end 57 of the cross pin plays in a hole 59 in the upward projecting end 60 of a horizontally placed bar 61 pivoted at its inner end to the plate 20 to which the lever 19 of the brake system is pivoted. A pair of brackets 63, 64 depend from the inner sides of the outer longitudinal beams 65, 66 of the floor frame and each bracket has a round hole through it, each hole having a notch 67 on one side to receive a spline 68, 69 on a cross rod 70. This rod 70 extends from side to side of the car and has at its ends handles 71, 72, which are under the side beams of the car within easy reach of the operator while passing along at the side of the train. In its central part this rod is cranked as at 73 and the bar 61 passes above the cranked portion, the relative height thereof being such that the bar 61 will be raised out of its normal position when the rod 70 is turned to bring the cranked portion upward, the rod 70 thus acting to raise bar 61 so as to remove the switch pin 56 out of the grooves of the switching cylinder 47. The cross rod 70 is so fitted as to move readily from side to side when in this position but to be held against such movement when in any other position. This is effected by the provision of the splines 68 and 69 and by so placing the notches 67 in the bearing brackets that the

rod must be in the position of contact with bar 61 before the spline can be entered into the notches 67. The sidewise movement is limited by the handles 71, 72, acting in conjunction with the outside of the brackets and shoulders 74, 75, acting in conjunction with the inside of said brackets.

Between the handles 71 and 72 are shoulders 74 and 75 the splines 68 and 69 are placed but they do not extend the whole distance, there being a clear round bearing left at each end of the splines so that the cross rod can freely turn when at either extremity of its sidewise movement but cannot be turned while intermediate thereof, while the splines are in the notches. The cranked portion 73 of cross bar 70 is provided with a notch 76 which, when the rod is in position to move sidewise, engages a short spline or tooth 77 on the under side of an arm 61.

Suitable links 78, 79 are provided depending from the side beams, by which to lock or sustain the handles 71 and 72 in their raised positions. When the rod 70 is turned it raises the bar 61 and this in turn raises the switch pin out of the set of switching cylinder grooves in which it is engaging. It is then in position to be transferred to a position over the other set of grooves which is done by shifting the rod 70 as before described until the splines pass through the supporting brackets and the round bearing is reached, when by dropping the handle, it will hang by its own gravity, and that of the cranked part of the rod, out of contact with arm 61. This shifting movement carries the lever 23 from side to side and the object of such shifting will now be explained. When the switch pin is in either of the outer grooves 51 or 53 the lever 23 is in its outer position on either side and the face 28 is removed to one side or the other of the path of the bumper or push head 29 and the whole of my brake mechanism is inactive, and when the switch pin is in either of the inner annular grooves 50 or 52, the lever 23 is in position to bring the face 28 in the path of the bumper head 29 and the brake mechanism is in active position. Supposing the switch pin to be carried over by the shifting mechanism and dropped into the outer annular groove 51. As before stated the parts are in inactive position and the train is ready to go forward in the direction indicated by arrow *a* in Fig. 5. It will be readily apparent that the top of the cylinder 47 will move in the same direction the car is moving and when this takes place the pin will be switched from groove 51 into and through switch groove 54, to and into annular groove 50. This brings the face 28 in the path of head 29 and the mechanism is in active position, in which position it will continue as long as the car continues to move in that direction. If, during the motion, the speed of the engine is slackened, the cars will run up toward each other and by their momentum, set the brakes as before described, and the more sudden the slackening, the greater will be the momemtum and the harder and quicker the brakes will be put on. If, at any time, it is desired to back the train, the reversal of the movement will cause the car, and consequently the top of the switching cylinder, to move in the direction of arrow *b* and by virtue of the peculiar formation of the grooves, the pin will ride through switch groove 54 into outer annular groove 51 shifting the parts so that face 28 is out of the path of the bumper 29 and the brake being inactive the train may be backed as much as desired. If the train is made up to move forward in the direction of the arrow *b*, the shifting rod is drawn to that side and the pin dropped into outer annular groove 53, bringing the face 28 to the right of head 29 and the parts again in inactive position. As soon as the car starts, the top of the switch cylinder moving in the direction of arrow *b*, the pin will ride in switch groove 55 and be carried over to inner annular groove 52 thus bringing the face 28 into the path of head 29 and the parts into active position, ready to be actuated by the momentum of the cars in the reverse position to that just before described. By backing the car, the motion of the cylinder will be reversed, the pin switched over to outer annular groove 53 and the parts brought into inactive position. To effect these switching movements of the pin in the grooves, it is only necessary to make the bottoms of the grooves inclined, the shallowest parts being on top of shoulders 80 and 81, and the deepest parts at the points 82, 83, (see Fig. 5) so that when the cylinder is moving in direction of arrow *a* the pin must move out of either groove 50 or 53, but will remain in either groove 51 or 52, and when the cylinder is moving in direction of arrow *b*, this action is reversed with the results already stated. This construction would be entirely practicable but would be slightly objectionable for the reason that where the pin was remaining in either of the grooves, as for instance in inner annular groove 50 when moving in direction of arrow *a*, every time one of the shoulders 81 passed under the pin, the pin would drop down and strike the bottom of the groove at the deep point 83. This causes the pin to wear itself and the bottom of the groove and makes a noise every time it drops. To remedy this I have provided the following mechanism. To the carriage 35 is pivoted a trip lever 84 which lies alongside of the carriage and has at one end a horizontally projecting arm 85 which passes under and engages the projecting end 57 of the cross pin which passes through the switch pin 56 and at the other end a vertically projecting arm 86 which lies between the cross beam of the truck and a horizontal arm 87 projecting laterally from the push bar 30. When the brake is on the bar 30 is pushed inward and the arm 87 with it. In this position the switch pin 56 drops by gravity into its lowest position, but when the cars are moving and

the brakes off, the bar 30 is in its withdrawn position, in which position it causes the arm 87 to press upon the arm 86 which raises the other end of lever 84 and with it arm 85 and switch pin 56. The extent to which it will be raised by this mechanism has been previously determined and is sufficient to cause it to clear the bottom of the annular grooves 50 and 52 which are made deeper than the outer annular grooves 51 and 53, and at the same time remain within their walls. This prevents the objections noted and while the cars move forward this condition continues. As soon as rod 30 is pressed inward, to set the brakes, the pin again drops to the bottom of the groove. The head 29 moves with the body of the car when depressed by load, but the face 28 is not subject to such movement being secured to the truck. Contact is maintained in the variations of height of the head by making both of them high enough to allow for such variation, and the face is made wide enough to allow for the slight change of position laterally when the switch pin is in groove 50 or 52.

The bar 88 connected to the lever 19 is intended to connect with a safety attachment not shown or described.

Having thus fully described the construction and operation of my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an automatic brake mechanism, the combination of a draw bar mounted upon a portion of the framing whose vertical position varies with the weight of the car, and a variable stop to limit the movement of the bar, said stop being rigidly secured to a fixed portion of the framing, substantially as described.

2. In an automatic brake mechanism the combination of the draw bar, a push bar, and an intermediate pivoted lever, all mounted on a portion of the framing whose vertical position varies with the weight of the car, and a variable stop interposed between the lever and the push bar, said stop being rigidly secured to a fixed portion of the framing, substantially as described.

3. In an automatic brake mechanism, the combination of a draw bar and push bar mounted on a portion of the framing whose vertical position varies with the weight of the car, and an intermediate wedge-shaped stop block, said block being rigidly secured to a fixed portion of the framing with its wide part uppermost, substantially as described.

4. In combination the draw bar, the lever pivoted to the floor frame, the spring for normally retracting the lever, the wedge shaped stop for said bar, and the brake mechanism operated by the movement of the pivoted spring pressed lever as set forth.

5. In combination with the ordinary brakes of a car and their operating mechanism comprising a bar pivoted centrally below the floor frame a pivoted carriage, a lever centrally pivoted to the end of said carriage, a push bar for operating said lever, a pivoted lever for operating said push bar, a variable stop for said pivoted lever, and the draw bar operating upon said lever, as set forth.

6. The combination with a draw bar having a recessed rear end, of a spring seated in said recess, and a loose yoke connected with the draw bar and bearing against the spring, substantially as described.

7. In combination the draw bar, its spring pressed yoke, the spring returned lever in the path of said yoke and brake operating mechanism connected to said lever as set forth.

8. In combination the drawbar, the spring returned bar pivoted to the car, an arm connected to its free end, and switching mechanism operated by the movement of said arm, as set forth.

9. In combination the draw bar, the spring therein, the pin through the spring and the end of the draw-bar and the yoke encircling the end of the drawbar and having a bearing, inside the draw bar, upon the end of the spring as set forth.

10. In combination the draw bar, the lever pivoted to the cross beam of the floor frame, in the path of the draw bar, the spring for normally holding it in contact with the draw bar and the wedge stop secured to the truck with its head upward as set forth.

11. In combination the carriage pivoted to the truck, the lever pivoted to the end of the carriage and having a bearing face at one end thereof and the push bar with head thereon to engage with said head, the face and head being of a width to permit lateral and vertical movement while preserving contact as set forth.

12. In combination the switching cylinder having annular grooves of unequal depth, the switch pin engaging said grooves, and the trip pin arranged to hold the pin within, but out of contact with the bottom of, the deeper grooves, as set forth.

13. The switching cylinder provided with sets of two annular grooves each and switch grooves connecting the annular grooves, one annular groove of each set being deeper than the other as and for the purpose set forth.

14. In combination the carriage, pivoted to the truck, the pivoted bar connected at its center therewith, a switch pin mounted at the pivotal point, a cross pin in the switch pin and projecting toward the center of the car, a shifting bar engaging said pin, and a switching or shifting rod for moving the shifting bar laterally as set forth.

15. In combination with the floor frame of a car a shifting bar pivoted at the center thereof, and a rod for laterally moving said shifting bar, said bar being mounted in brackets depending from the side beams of the floor frame and having a central cranked portion to support and adjust the shifting bar, as set forth.

16. In combination the pivoted shifting bar, the laterally movable and rotatable switching

rod mounted below the floor frame and having the central cranked portion and short splines, and the brackets depending from the floor frame and having round holes to receive the switching rod and side notches to receive the splines, as set forth.

17. In combination the carriage pivoted to the truck, the lever centrally pivoted thereto, the vertically movable switch pin at the center thereof having cross pin the trip lever pivoted to the carriage having horizontal arm to engage the cross pin, and an upright at the opposite end, the push bar, and the horizontal arm thereto to engage the upright on the trip bar as set forth.

18. In combination the push bar, the carriage and the switch pin, of a trip bar pivoted to the carriage and engaging the switch pin at one end and the push bar at the other, whereby the withdrawal of the push bar causes the partial elevation of the switch pin as set forth.

19. In a car brake mechanism a cam grooved cylinder, a switch pin to engage its grooves, a trip bar, and the push bar, the trip bar and push bar operating to partially elevate the switch pin, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN W. LUCE.

Witnesses:
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W. T. B. HYNES.